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THE NEWSPAPER FOR
THE HOBBYIST OF VINTAGE
ELECTRONICS AND SOUND

THE HORN SPEAKER

RADIO SETS FOR 1937-'38

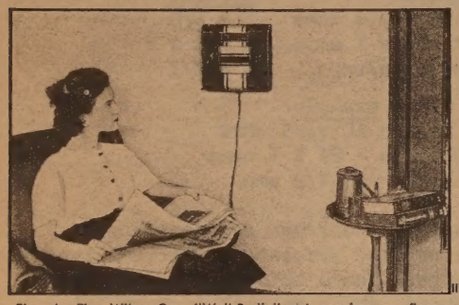
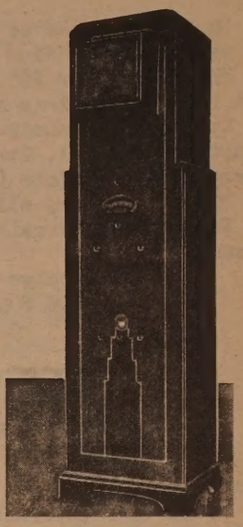


Fig. A. The Wilcox-Gay "Wall-Radio" set requires no floor or table space.

Radio sets for the forthcoming season exhibit many unusual features as compared to sets of previous seasons. However, only a few of the more outstanding designs are described in this review. In some instances the circuits, in addition to the housings, are of interest.



The television receiver

WILCOX-GAY WALL RADIO SET

DESIGNED expressly to hang on the wall, this radio set requires neither floor nor table space. It is as easy to put in place as an electric clock.

Its streamlined metal case is but 3 ins. thick x 10¼ ins. square, yet, by virtue of its unique construction, contains a complete A.C. superheterodyne receiver. Features include 5 all-metal tubes; automatic volume control; slide-rule type dial using a glass light-refracting scale; and, dynamic speaker. Sensitivity and selectivity are of a high order.

The set has a built-in aerial which is usually satisfactory for local reception. However, an outside aerial wire is molded in with the line cord so that only a single cord runs to the set, the same as to an electric clock or lamp.

The schematic diagram of this receiver is illustrated in Fig. 1. Figures A, B and C illustrate the comparative size and chassis view of this receiver. The metal case is finished with a beautiful iridescent enamel in contrasting tones of black and silver, although brown and gold, green and cream, and red and gray hues are also available.

(Readers will recall that September, 1936 *Radio-Craft* contained probably the first wall radio construction story. The more modern commercial design achieves unusual beauty and compactness.)

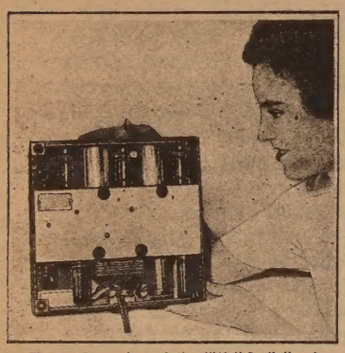


Fig. B. Rear view of the "Wall-Radio" set.

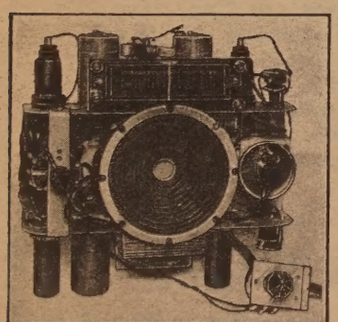


Fig. C. The compact chassis of the "Wall-Radio."

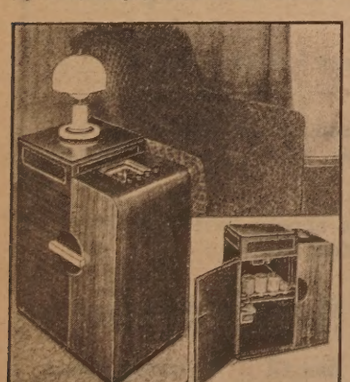


Fig. D. The International Kadette Model 649 "Equafonic" receiver.

INTERNATIONAL KADETTE "EQUAFONIC" SET HAS NEW METHOD OF PROJECTING SOUND

IN THIS NEW model, which is of the arm-chair type, the speaker cone is mounted horizontally. Immediately above this cone is a special baffle designed to carefully computed acoustical curves which bend the sound waves and project them in all directions. The grilles are located on all 4 sides and equal volume intensity in all directions is obtained. An additional feature is the inclusion of a cocktail service.

The circuit diagram of this receiver is illustrated in Fig. 4. A 5-tube superheterodyne is employed, using a type 6V6 tube in the output stage. The set operates on 110 V., 60 cycles, A.C.

LAFAYETTE "TELE-DIAL" 17-BUTTON RECEIVER

THE NEW Lafayette Tele-Dial receiver, distributed by Wholesale Radio Service Co., Inc., tunes stations just like a dial telephone. Seventeen station control buttons are arranged around the periphery of an 8½-in. dial—more stations than the average person listens to from day to day. The set utilizes a 13-tube superheterodyne circuit, including type 6L6 beam power output tubes and a 6G5 visual tuning indicator. Two

Continued on page 3.

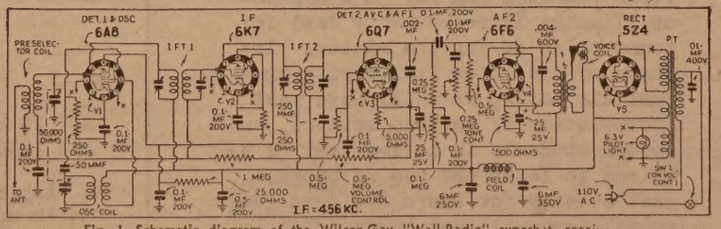


Fig. 1. Schematic diagram of the Wilcox-Gay "Wall-Radio" superhet. receiv

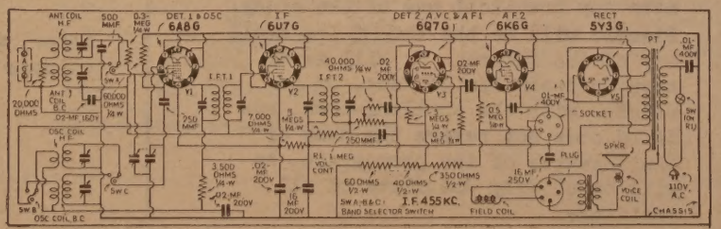
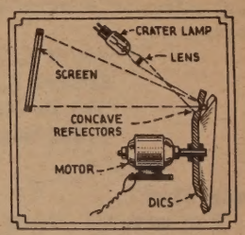


Fig. 2. Schematic diagram of the Crosley "Teletune" Compact Fiver.

A Complete Television Receiver

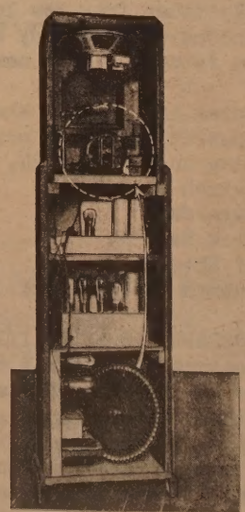
AT last, with the announcement of a television receiver shown at the left and right, the public is beginning to get a glimmering of the particular corner around which television has been hiding for the last few years.

The set is a product of the Hutton Television - Radio Corp. and bids fair to find an excellent market. It incorporates, aside from the television receiver, a broadcast receiver so that the reception of sound and image may be made simultaneously.



Schematic of lens system.

The set has two main features: First, the disc is stamped from a single sheet of metal, and is slotted radially, so that each section between two slots may be bent at different angles; second, the crater lamp is so placed with respect to the screen that a long beam-length



Rear view of the combination television and broadcast receiver.

(Continued on page 3)

FIND OF THE MONTH

Here's our find of the month: We were lucky to find a Model 10 AK Breadboard for $65. with 5 good 01A tubes early this month.

Later in the month we were fortunate to find: 1. Grebe MV1 Synchrophase. 2. 3 tube (199s) Meteor 3. 100RCA speaker, all this for $20.

So the good bargains are still around.

Lee & Carolyn Bruton
Golden CO 80401

LETTERS

EDITOR'S MAILBAG

Dear Jim:

Would like information on what we believe to be an Atwater Kent breadboard model ten receiver.

I just saw your ad in October Hemmings.

Dale Motter
Box 166
Mt. Blanchard, Ohio
45867

Dear Sir:

Your new article "The Newcomer" was very interesting and I hope the beginning of a very new informative series.

Yours truly,
Ernest E. Mintel
303 E. Gibson St.
Canandaigua, NY. 14424

Dear Jim:

For several years now I have been enjoying your newspaper.

Enclosed is a copy of an editorial which I thought you might find of interest. It appeared in the December 8, 1877 issue of the American Rural Home (Rochester, N.Y.) newspaper, and was apparently taken from New York Papers. Opinions were already being formed on the future of this new invention.

It is interesting to note that the editorial appeared two weeks prior to Edison's filing on December 24, 1877 of his phonograph patent.

Regards,
Dick Ransley
17 Sheridan St.
Auburn N.Y. 13021

PHONOGRAPHIC POSSIBILITIES

If the phonograph, with all the possibilities its inventor claims for it, should be brought into general use, I fear it may become in the hands of a malicious or even a thoughtless person an instrument of exquisite torture. Suppose the wife of one's bosom should keep bottled up, as it were, for domestic use, the utterances of one's mother-in-law. Suppose she should exhibit them as occasion might seem to her to require. When taken, I imagine, one would be well shaken. Suppose, when one is pouring out one's soul to one's adored and swearing to the truth of the present "first love," that some malicious person or rival should open the door of the phonograph and give one's many former tales of love in one's own voice. Suppose some adroit lawyer should amuse the judge and jury of some breach of promise trial, with the exact tones, imploring, adoring, &c., of the unhappy defendant. Suppose as one is at one's boarding-house table, expatiating upon one's wealth, &c., the Celtic and angry tones of one's washerwoman should be heard demanding instant payment of "that little bill." Suppose all the secrets of a Washington, Albany, or other lobby should be collected and reproduced to an astonished community. Suppose all the petty meannesses of some godlike man or angelic woman should, through the agency of the phonograph, shock his or her admirers. Suppose some servant should slyly charge the infernal machine of which I am now writing with the Caudle and other lectures of a model husband and wife. Suppose what our friends say of us should be made known to us with all the claimed exactness of the phonograph. Do you suppose so delicate an instrument as the phonograph must of necessity be, can stand the wear and tear of a talking woman in "good form?" I have in my mind's eye one who would test it to its utmost capacity.

There is good reason to believe that if the phonograph proves to be what its inventor claims that it is, both book making and reading will fall into disuse. Why should we print a speech when it can be bottled, and why should we learn to read when if some skilled clocutionist merely repeats one of "George Eliot's" novels aloud in the presence of a phonograph, we can subsequently listen to it without taking the slightest trouble? We shall be able to buy Dickens and Thackeray by the single bottle, or by the dozen and rural families can lay in a hogshead of "Timothy Titcomb" every fall for consumption during the winter. Instead of libraries filled with combustible books, we shall have vast store-houses of bottled authors, and though students in college may be required to learn the use of books, just as they now learn the dead languages, they will not be expected to make any practical use of the study. Blessed will be the lot of the small boy of the future. He will never have to learn his letters, or to wrestle with the spelling-book, and if he does not revere the name of the inventor of the phonograph, he will be utterly destitute of all gratitude.

The Newcomer

By O. H. McDonald

Continued from last month.

These three factors: volts, amps. and ohms have a proportional relationship with each other and this is covered in ohm's law which states "One volt of force will cause one amp. of current to flow when opposed by one ohm of resistance."

standard	formula
ampere=volts/ohms	I = E/R
volts=ohms X amps.	E = R x I
ohms=volts/amps.	R = E/I

example
2 amps. = 10 v./5 ohms
10 volts = 2A X 5 ohms
5 ohms = 10 V/2 amp.

Any time current passes through a wire or load (resistance) it has two effects. There is a magnetic field produced, which we will discuss later, and heat is produced. The heat produced or sometimes light given off is measured in watts. This wattage is the power absorbed or used and is directly proportional to the current and voltage. Wattage = volt X amps. Example: A 60 watt bulb burning on 120 volts uses 1/2 amp. A 250 watt bulb will draw a little over 2 amps.

The ohm and watt law is actually very simple but practice and thought on various circuits will increase your knowledge and application to these laws that are very essential in the electrical and radio field. Review this particular article and I'm sure you can find other help with the electron theory and ohm's law.

Thank you for your interest in this article and next month we will cover inductance to help us understand the performance of transformers in the oldies.

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RADIO SETS FOR 1937-'38

(Continued from page 1)

An unusually large number of new features in radio sets for 1937-'38 are represented in the limited group of receivers described in this article. Among the more unusual features are the following: Special tone chamber for improved audio quality in mantle sets; button tuning combined with automatic frequency control; wall-mounting design, with integral power cord and antenna lead; end-table with improved sound-dispersion system.

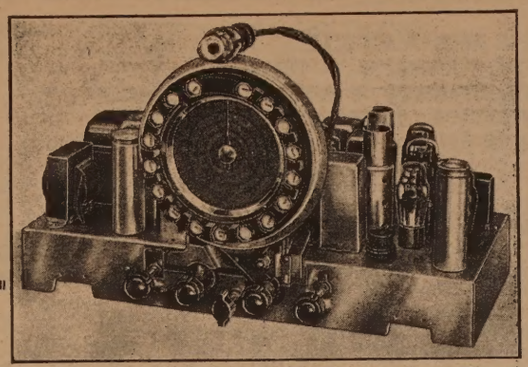

Fig. E. The Lafayette "Tele-Dial" 13-tube superheterodyne receiver.

12-in. auditorium dynamic speakers handle the large output.

Other features include 3-band continuous tuning from 16.4 to 568 meters, delayed A.V.C., automatic bass compensation, high-fidelity switch for increasing the band width of the I.F. circuits, tone control, and a power transformer which operates on 95 to 130 V., 50/60 cycles A.C., without adjustments.

The mechanical adjustment on the Tele-Dial receiver is carried to within 2½ kc. of a given station. A bi-metallic thermostatic condenser is said to be incorporated "to compensate for drift caused by temperate changes."

The other 3 buttons are for turning the set off, scanning the dial and to permit manual tuning. The mechanism is motor-driven to insure reliable operation. While the pointer moves across the dial the speaker is automatically silenced until the station selected is tuned-in. The automatic frequency control of the receiver then assures perfect tuning, even if the motor stops in only the approximate vicinity of the station desired.

Other attractive features are a tone monitor, which reproduces the highs and lows of sound in proper proportion; 2-stage intermediate frequency system, assuring maximum sensitivity; a large louvre dial, which permits easy visibility and the spreading of short-wave stations over a comparatively large surface; visual volume control indicator; visual tone control indicator; a 4-band range; automatic band indicator; high-low speed tuning; automatic tone compensation; automatic volume control; preselector and wave-trap circuits; and a 12-in. stabilized dynamic speaker.

The set is designed to operate from a 115 V., 50/60 cycle, A.C. line, and consumes approximately 160 W. The cabinet is of modernistic design.

G.E. 13-TUBE "TOUCH TUNING" SUPERHETERODYNE

ILLUSTRATED in Fig. F is the G.E. model F-135 receiver housed in a large floor-type cabinet following the modern trend, particularly in the treatment of the grille bars and opening. Beneath the tuning dial of this set, there are 2 rows of buttons, 13 of which may be plainly marked with the letters of the more important stations in a particular locality. A mere touch of the button marked with the letters of the station desired and, automatically, the tuning indicator speeds across the dial to the one point where the program selected is tuned to hair-line precision.

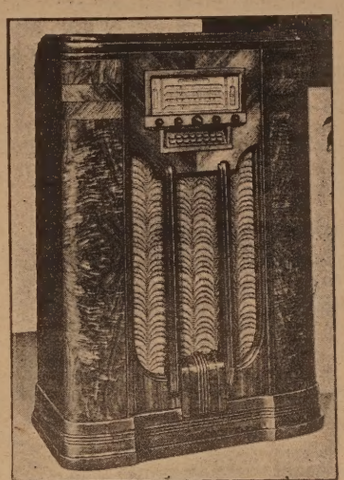

Fig. F. G.E. model F-135 "Touch Tuning" receiver.

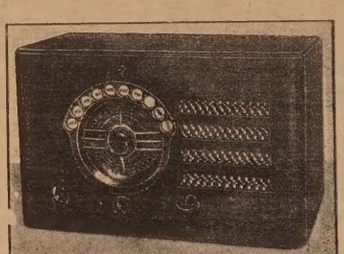

Fig. G. The Crosley "Teletune" Compact Fiver.

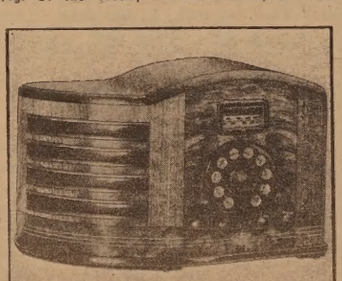

Fig. H. Emerson model AT-172 "Miracle Tone Chamber" set with automatic tuning.

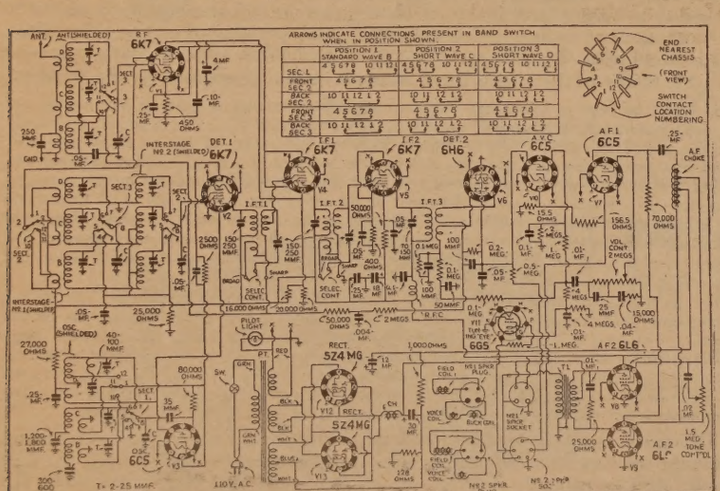

Fig. 3. Schematic diagram of the Lafayette "Tele-Dial" 13-tube superhet.

NEW CROSLEY "TELETUNE" FIVER

THE LATEST Crosley creation, as illustrated in Fig. G, provides a highly convenient and quick method of tuning in the popular stations. The "Teletune" permits one to swing quickly from one station to another with a single flip of the dial. Printed call letters are provided for quick insertion in the 10 openings provided in the escutcheon of the dial.

Other interesting features include dual band reception (540 to 1,720 kc.; 5,800 to 15,400 kc.); 5-in. electro-dynamic speaker; full-vision, edge-illuminated, 3-dimensional "mirro-dial" with graduations fused on the convex glass; pentode output tube; automatic volume control; power supply noise filter.

For a small set it has a healthy output of 2 W. The model illustrated is known as the Fiver Compact. The front of the cabinet is gracefully rounded and the side panels are made of highly figured walnut veneer. Measures 8⅛ x 13 7/16 x 6 13/16 ins. deep. The circuit diagram of this receiver is illustrated in Fig. 2.

EMERSON "MIRACLE TONE CHAMBER" 6-TUBE A.C. SUPERHETERODYNE

ELIMINATING the old-fashioned "muffling" cloth of the speaker, the "miracle tone chamber" of this Emerson set, by a series of seasoned, grooved-louvre wood deflectors, causes a uniform distribution of sound waves of all frequencies. "It smoothes out the drastic harsh resonances and equalizes the flow of tone," states the manufacturer.

The set illustrated in Fig. H is the model AT-172. Other interesting features include complete automatic tuning of desired "key" stations; 3 tuning bands (American, Foreign and Police); 6½-in. dynamic speaker; automatic volume control; and, tone control. The set utilizes a modern A.C. superheterodyne circuit employing 6 tubes. The cabinet is of hand-rubbed walnut, modernistically styled; measures 11 x 8½ x 9½ ins. deep.

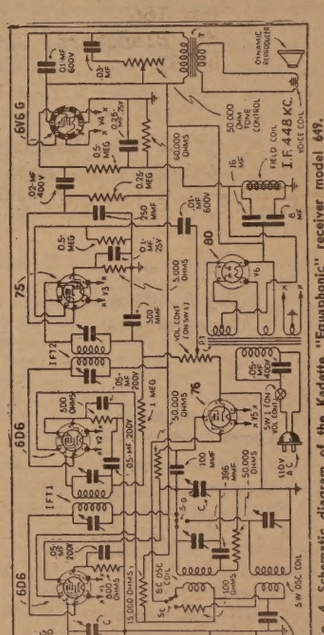

Fig. 4. Schematic diagram of the Kadette "Equaphonic" receiver model 649.

1932 TELEVISION

is secured in a very short space.

These two points are illustrated in the drawing reproduced here. In each of the sections mentioned, a concave indentation is stamped and its surface polished. The crater lamp is so focused that the diverging beam of light from the lamp strikes the disc and is reflected to the screen. Thus, all of the light is utilized and a picture 5 x 6 inches is secured in a cabinet whose depth is only 11 inches.

from RADIO CRAFT May 1932

The photograph at the right shows the 60-line disc removed from its motor in order to illustrate the respective location of the crater lamp and its associated parts.

Sound is emitted from the loud speaker at the top of the grandfather type console illustrated.

Clyde Fitch is the inventor.

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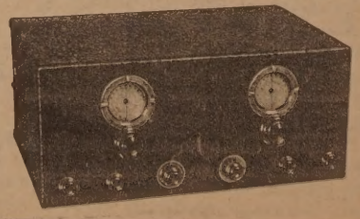

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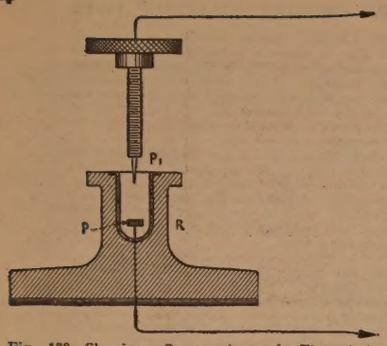


Fig. 178—Showing Construction of Electrolytic Detector.

EXCERPTS FROM PRACTICAL WIRELESS TELEGRAPHY, A TEXT-BOOK FOR STUDENTS OF RADIO COMMUNICATION, BY ELMER BUCHER IN 1921.

141. Electrolytic Detector.—A detector widely used in the early stages of wireless telegraph development in the United States is the so-called *"whisker point" electrolytic,* which is particularly sensitive and uniformly stable in operation. Of late, however, the electrolytic cell has fallen into almost complete disuse for commercial working, even though its reliability is generally admitted. From a commercial standpoint this may be accounted for by the fact that the initial adjustment of the device is rather troublesome.

The essentials of the detector appear in Fig. 178, where a small glass receptacle R has sealed in the base a small piece of *platinum P* about ½-inch square. About a half-dozen drops of a 20 per cent. solution of *nitric acid* or a *supersaturated solution of caustic potash* cover the lower electrode. The *upper electrode* P-1 is an extremely *fine platinum wire* about .0001 inches in diameter. The depth of immersion in the liquid is carefully regulated by a finely threaded screw adjustment. The platinum wire is generally coated with silver, which afterward is dissolved by dipping the point of the wire in a strong solution of nitric acid, leaving the small platinum tip exposed.

The silver need not necessarily be taken off the platinum wire by a strong acid solution; the point can be immersed in the usual detector solution of dilute nitric acid and an extra strong local current sent through the cell for a few moments until the silver is completely dissolved. Afterward the point is adjusted to just touch the solution.

Now, if this detector is substituted for the carborundum rectifier in the circuit of Fig. 153a, and the positive pole of the local battery connected to the fine wire electrode, the device becomes a very sensitive detector of currents of radio frequency, provided the small electrode just touches the surface of the acid.

The fine wire electrode is frequently coated with glass, so that the extreme tip only is exposed to the action of the solution, hence the depth of immersion of the entire electrode is of little importance and the detector is less difficult to adjust.

Several theories have been advanced to account for the action of the electrolytic detector, one being that the response in the local head telephone is caused by change in resistance of the small platinum wire during the passage of radio-frequent currents.

Another investigator contends that the current of the local battery flowing through the electrolytic cell forms gas bubbles which polarize the fine wire electrode, and thereby partially reduce the flow of current from the local battery. Then when oscillations of radio-frequency pass through the cell, the gas bubbles are temporarily destroyed, which permits an increase of the strength of the local battery current at rates corresponding to the spark frequency of the transmitter.

The electrolytic detector is adjusted for maximum strength of signals, by carefully regulating the strength of the local battery current. If the current is too strong, a hissing sound is obtained in the head telephone which will prevent the reception of signals. If, on the other hand, the local current is too weak, the detector will barely respond. Some difference of opinion exists regarding the direction in which the local current must flow through the cell, but it is usual to connect the fine wire electrode to the positive pole of the cell.

H. Shoemaker has discovered that the large electrode may be of zinc, and if the small platinum point and zinc are immersed in a dilute sulphuric acid solution, the cell not only acts as a detector of oscillations, but supplies its own local E. M. F. as well. In this form the detector is termed a *primary cell* detector.

129. The Carborundum Detector and Tuning Circuits.—The most widely used of all detectors is the *carborundum crystal rectifier,* the tuning circuits for which are shown in Fig. 153a, b, c. These diagrams indicate as well the apparatus included in a modern receiving set. In addition two modified circuits showing the connection of the potentiometer in various modern tuners, are presented. Before proceeding with an explanation of the circuits of Fig. 153a, the function of the *potentiometer* will be explained.

The application of a weak battery current to the carborundum crystal and head telephone circuit has been found to have a marked effect on the intensity of the incoming signals, but the strength of the current must be carefully and closely regulated and must be passed through the crystal in a definite direction to secure the maximum response. Ignoring for the moment an explanation of the function of the local current in a radio receiver, the reader should note the diagram, Fig. 154, showing the connections of the potentiometer to a local battery.

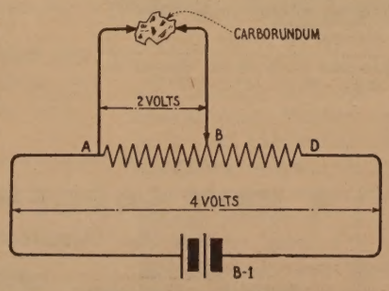


Fig. 154—Connections of Potentiometer for Crystal Detector.

A resistance coil A, D, is connected to the terminals of a 2 or 4 volt battery B-1. The crystal has the variable connection B which is generally a sliding contact. According to the law of divided circuits, *the maximum E. M. F. is maintained across the crystal when B is shifted to the end D, but in the direction opposite or towards A, the E. M. F. gradually reduces to zero.*

In the circuit originally adopted for the carborundum crystal, the potentiometer and detector were connected as in Fig. 153-a, but the modified circuits of Fig. 153-b and Fig. 153-c are also in use. In Fig. 153-b the telephone and potentiometer are *shunted* across the stopping condenser C-3 but in Fig. 153-c the potentiometer is connected in series with the crystal rectifier. Since the resistance of the crystal exceeds that of the potentiometer by several thousand ohms, the resistance of the latter has little effect on the strength of the incoming signal. Although practically equal results are obtained with either connection, the circuit of Fig. 153-b is pointed out by some investigators to be the one which gives the maximum response.

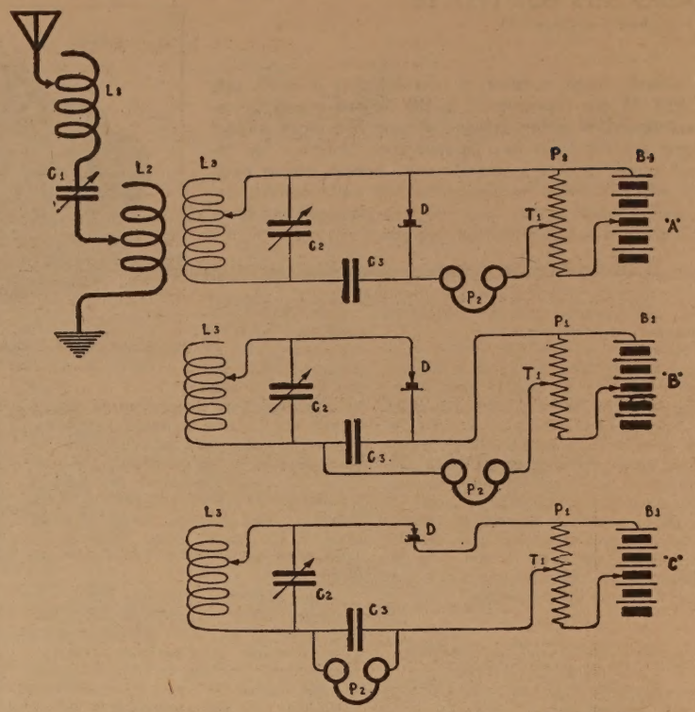


Fig. 153a, b, c—Complete Circuit for the Carborundum Rectifier and Receiving Tuner.

134. Classification of the Receiving Detectors.—The receiving detectors of wireless telegraphy differ greatly both in point of mechanical construction and mode of operation, and, in addition, they possess widely varying degrees of sensitiveness. Certain types, for instance, are *highly sensitive* to electrical oscillations but are difficult to keep in permanent adjustment; others are *less sensitive* but possess *marked degrees of stability.* Still others are in the nature of a compromise and may occupy approximately a position midway between the two extremes.

Some receiving detectors rely upon the *principal of rectification* (as we have already shown) and will convert an *alternating current of radio-frequency to a uni-directional current;* others have the property of rectification combined with the *ability to vary a local source of battery current* in a manner much similar to the working of an ordinary telegraph relay. The operation of certain other detectors is based upon the *influence of electrical oscillations upon magnetized iron* or upon the ability of these oscillations to cause certain *granulated metals to cohere.*

It should be kept in mind that the most sensitive receiving detector is not always the one most convenient or the most practical for commercial use. For instance, extremely sensitive amplifying detectors may require intricate apparatus, having so many points of adjustment that its manipulation may call for the services of a highly skilled engineer and further the circuits may be of such a type that the apparatus cannot be quickly changed from one wave length to another. In event of the latter, the tuner would be of little value for marine service which requires the receiver to be one capable of quick adjustment to land stations operating at various wave lengths. Furthermore, extremely sensitive detectors bring in a certain amount of interference from far distant stations which would not be heard on less sensitive detectors.

The most practical detector for commercial working is one that combines a fair degree of efficiency with ruggedness and stability of adjustment, and so far among the crystal detectors none has, in this respect, excelled the carborundum rectifier. The Marconi magnetic detector is universally recognized as being the most stable and "foolproof" of all receivers but it lacks sensitiveness on the shorter waves. The vacuum valve detectors, on the other hand, are considered to be the most sensitive among commercial receivers, but they possess the disadvantage of requiring complicated circuits for best results.

To impress upon the reader's mind the *utility* of the various types of receiving detectors, we may classify them under five general headings. Under the first heading we may name the *detectors which require no local battery* and under the second heading, *those detectors* in which the response in the telephone depends upon the *application of a local battery current* as well as upon the current of the incoming oscillations.* Certain detectors may be classified under both headings because they may function to some extent with or without a local battery.

In addition we may note under a third heading the detectors considered as *rectifiers of radio-frequent* currents and in a fourth and fifth headings, those suitable for *response to either damped or undamped oscillations* respectively. It is to be noted that a few types come under all headings.

Detectors Functioning Without Local Battery.	**Galena—Silicon—Zincite Bornite—Carborundum (satisfactory for short distance receiving)—Fleming Valve (filament battery only).**
Detectors which depend upon the combined effects of received energy and local battery current.	**Carborundum—Zincite Bornite (sometimes used with local battery)—Fleming Valve (with local battery)—Three Element Valve—Silicon.**
Detectors having the Property of Rectification.	**Galena — Silicon — Carborundum — Cerusite—Zincite-Bornite—Fleming Valve—Three Element Valve—Electrolytic.**
Detectors of Damped Oscillations.	**Galena — Silicon — Zincite Bornite — Carborundum —Fleming Valve—Three Element Valve—Marconi Magnetic—(Tikker, Tone Wheel and Heterodyne system will give some response from spark transmitters, but are not satisfactory for such reception).**
Detectors of Undamped Oscillation.	**Tikker—Tone Wheel—Heterodyne Receiver—Vacuum Valve Oscillator.**

G-E TUNGAR BULBS, DATA, AND LIST PRICES

Cat. No.	*List Price	RECOMMENDED MAXIMUM OUTPUT D-c. Amps.	RECOMMENDED MAXIMUM OUTPUT D-c. Volts	Recommended Filament Voltage ±5%	Approx. Filament Current Amps.	D-C PICKUP VOLTAGE HOT Av.	D-C PICKUP VOLTAGE HOT Limits	D-C PICKUP VOLTAGE COLD Av.	D-C PICKUP VOLTAGE COLD Limits	D-C ARC VOLTAGE HOT Av.	D-C ARC VOLTAGE HOT Limits	D-C ARC VOLTAGE COLD Av.	D-C ARC VOLTAGE COLD Limits	Max. Inv. Peak Plate Volt. Half Wave	Time Delay Seconds	Max. Base Temp. Deg. C.	Socket Cat. No.
99X44	$5.00	6.0	25	2.2	17.5	3.5	2–6	6.0	2.5–11	6.0	4.5–9.5	7	5.5–10.5	105	NONE	160	217967
99X45	15.00	20.0	25	2.6	34	3.2	2.5–6	7.5	3–12	7.5	4.5–9.0	8.5	6–10	110	15	160	217967
289881	4.00	0.5	7.5	1.8	6	11	8–12	11	8–12	7	5.5–8.5	7	5.5–8.5	150	NONE		278768
12X825	4.00	2.0	75	2.0	13.5	12.0	9.5–15	12.0	9.5–15	7.5	5–9.5	7.5	5–9.5	275	NONE		278768
45X674	15.00	6.0	250	2.5	24	11.5	8.5–20	13.0	8.5–20	9.0	7–15	11.5	7.5–18	1000	300	90	M5556072G1
16X897	8.00	2.0	250	2.5	10	12.5	8–20	14	8–24	9.0	6–15	12.5	7.5–20	1000	300	90	M5556072G1
206501	4.00	2.0	75	2.0	13.5	12.0	9.5–15	12.0	9.5–15	7.5	5–9.5	7.5	5–9.5	275	NONE		Std. Edison
199698	5.00	2/0.5	25/30	1.8	12	12.0	10–14	12.0	10–14	8.0	5.5–10	8.0	5.5–10	105/120	NONE		Std. Edison
20X672	5.00	5.0	20	2.0	12	4.5	2.5–6	9.5	8–11	6.0	4.5–7.5	7.5	6–9	90	NONE		K3778926
189048	5.00	6.0	60	2.2	17	12.0	10–15	12.0	10–15	7.0	5–10	7.0	5–10	300	NONE		217967
189049	5.00	6.0	90	2.2	17	12.0	10–16	12.0	10–16	7.5	6–11	7.5	6–11	375	NONE		217967
217283	10.00	15.0	60	2.5	25	12.0	8–16	12.0	8–16	7.5	5–9	7.5	5–9	225	15		217967
76X13	15.00	20.0	75	2.6	34	2.6	2–6	7.0	5–12	6.5	5–11	12.0	8–15	275	180	160	217967

* List prices are for the purpose of calculating our net prices to distributors and may not be used as selling prices where they are in excess of seller's applicable maximum price established by the Office of Price Administration.

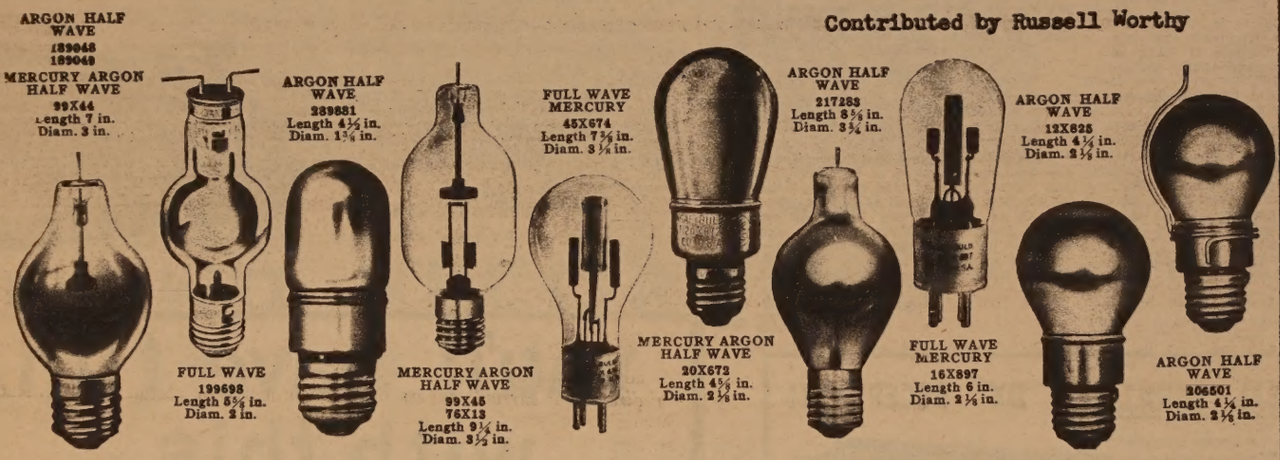
All Data and Prices Subject to Change without Notice.

G-E TUNGAR RECTIFIER BULBS

TUNGAR AND METALLIC RECTIFIERS

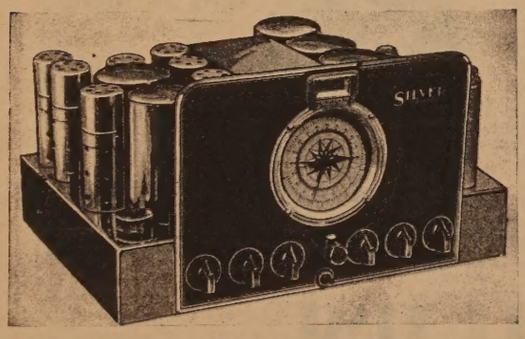
General Electric Company

Contributed by Russell Worthy



The Classic Radio

SHORT WAVE CRAFT for NOVEMBER, 1935



The "ship-shape" commercial appearance of this ultra modern 10 tube, 1200 to 33,000 kc. super-het, plus every new feature, makes it ideal for amateur or short-wave "DXer." (No. 319)

New SILVER Receiver for "Hams" or "Fans"

By McMurdo Silver

● OF all the receivers available to the serious amateur or short-wave B. C. L., (broadcast listener) superheterodynes predominate today due to their high selectivity, especially with crystal filter, and their ease and dependability of operation. They are, however, mostly all alike in that they use but one R.F. stage if any, and the usual and typical crystal filters in a conventional one or two stage I.F. amplifier. The past year has taught that more can be, and is, desired, as evidenced by the increasing appreciation of the image selectivity and noise elimination benefits of not one, but of two R.F. stages, of a quiet low gain I.F. amplifier and stable air-tuned and temperature-isolated circuits throughout.

The receiver illustrated herewith satisfies these latter day requirements and is described in this article—an *amateur*, not a "revamped" broadcast receiver, designed by amateurs for amateurs and to fit amateur pocketbooks, and usually to fit an amateur junk box assortment of standard parts. If it satisfies, as it does, serious *amateur* ("Ham") needs, it is automatically an excellent short-wave *broadcast* receiver, which it also is.

For the engineer its performance is easily described by saying that its four low-C 200 mmf. tuning bands cover 1700 to 33,000 kc., which includes the 160, 80, 40, 20 and 10 meter amateur and all short-wave broadcast bands, its sensitivity is below a microvolt all over this range, its inherent noise never exceeds 10 milliwatts at maximum sensitivity, its selectivity is variable from 150 cycles 10,000 times down to 10 kc., its fidelity is controllable from flat to 4 db. from 30 to 4000 cycles, to peaked audio for C.W. reception, its undistorted power output 3.0 watts, rising to a maximum of about 4.0 watts.

While considering the really ideal performance described above, let's take a look at its other features as briefly as possible.

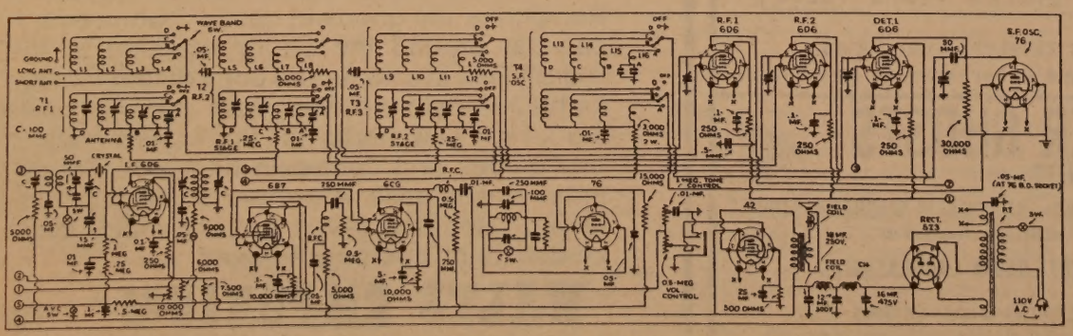
Circuit: Superheterodyne, with two 6D6 tuned r.f. stages on all four bands, suppressor grid injected 6D6 s.g. first detector, 76 electron coupled H.F. oscillator, one 6D6 i.f. stage, high gain 6C6 tetrode second detector, 6B7 amplified A.V.C., optimum inductively coupled variable-pitch 76 beat oscillator, 42 output pentode and 5Z3 rectifier.

Band Change: Individual coils for each band, picked up by dependable Yaxley eight-gang wave change switch just like you find in all good broadcast receivers.

Frequency Stability: Individually shielded coils, all circuits Hammarlund air dielectric, not compression mica, tuned and trimmed, plenty of ventilation, and temperature isolation make for the ability to stay "zero beat" on a good 20 meter signals for hours.

I.F. Amplifier: Set at 25 microvolts absolute sensitivity to place the limit of inherent noise at thermal agitation in the antenna circuit where it belongs, not as usual at the first detector so as to lose weak signals in set noise. Two Aladdin Polyiron 465 kc. I.F. transformers, air tuned, and variable as to selectivity to suit your taste. Crystal I.F. transformer dual tuned.

Sensitivity: Variable so you can adjust it with two knobs from 50 cycles wide to 10 kc.—or a socket wrench pushed through two I.F. can holes lets you vary the I.F. transformer coupling and selectivity even further.



Wiring diagram for the new "Silver" super-het for short and broadcast waves.

(Continued on page 6)

Crystal Filter: Of course, but one that makes the usual garden variety look sick by comparison. As much, and usually more sock in series circuit as when cut out, and in parallel, the ability to drop an unwanted heterodyne completely out without impairing phone signal quality.

Band-Spread: One tuning dial, accurately calibrated (yes, the builder can so align it without any extra test equipment) with geared, no slip, band-spread pointer on 200 division, 360 degree inside scale which accurately and positively relogs. Fast and slow tuning ratios, 23:1 and 130:1 spread, 1000 degrees on 160 meters, 700 degrees on 80 meters, 400 on 40, 120 on 20, and 200 degrees on 10 meters. Effective feet, not inches, of dial space on the amateur and short wave broadcast bands, since 360 degrees of band spread equals about one foot of dial space and five full turns of slow knob for 360 degree band spread pointer rotation.

A.V.C. (automatic volume control) of course, but amplified so it really does a job on weak signals, and speeded up so it does likewise on C.W. A switch cuts A.V.C. out for C.W., and in for phone if so preferred.

Controls: Enough and no more. Not usual blind knobs, but every one labeled as to what it does, and calibrated so you can tell that QSO just how much better he comes in tonight than he did with the old rig last night.

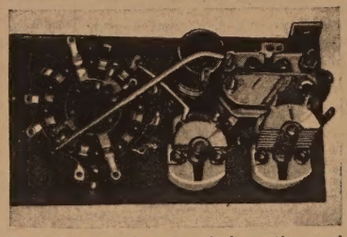
R-Meter: A sensitivity meter that lets you actually measure signals as weak as 5.0 microvolts absolute—and that's not an R9 signal, its about R2-R3.

Construction: Finish is polished chromium, like the finest custom-built jobs.

Alignment: The sensitivity meter is the output meter in aligning, the crystal in a temporary circuit using no extra parts except that odd '99 or 30 tube, its socket and a couple of flashlite batteries does the I.F. job, while signals do the whole R.F. job. Hammarlund's air trimmers make all this a pleasure, not the usual uncertain and God-knows-when headache.

In the photo, the knobs left to right are crystal phasing and parallel switch, beat oscillator pitch—on-off switch, audio volume control, A.V.C. on-off switch, five position (one dead for "send") wave change switch, tone control and sensitivity or manual volume control. The dial is shown 0-100—actually its outside carries four calibrated bands, and the inside 0-200 division, full circle band spread pointer scale.

Speaker new Jensen C8X, 8" (a matched 12" speaker can be had if preferred).



Typical wave change switch section and "D" band (16 to 32 mc.) inductance of the section 5D. The oscillator section is shown with the two low-frequency oscillator padding condensers, only needed for the full-wave coils.

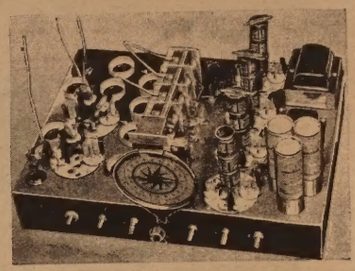
Here is the compiete parts list—all standard high quality parts of dependable makers. You can build this receiver, building as you buy, building all at once, or you can buy it as a laboratory built and tested R.C.A. licensed complete receiver. Substitution is not recommended—high frequency receiver specifications simply must not be played with, for even resistors, let alone tubes and other parts, are critical, and other equally good parts will usually vary enough to upset performance seriously.

Model 5D Silver Parts List

Alladin Radio Industries, Inc.
2—465 k.c. Polyiron Core and Coil Assemblies
Chicago Transformer Company
1—2067 Power Transformer 110 MA, 325 V. Sec.
1—2856D Filter Choke
Crowe Name Plate & Mfg. Company
1—4½" Two-Speed Band Spread Airplane Dial with "Radio-Silver" calibrated scale
1—"Radio-Silver" Control Panel
Hammarlund Manufacturing Co.
16—APC25 Air Trimmers—Type D, 25 mmf.
5—APC100 Air Trimmers—Type D, 100 mmf.
1—MICS1000 Trimmer 1000 mmf.
2—SM15 Star Midgets—15 mmf.
Continental Carbon Company
4—250 ohm, ½-watt Resistor
1—500 ohm, 1-watt Resistor
1—6000 ohm, 1-watt Resistor
2—10,000 ohm, ½-watt Resistor
1—3000 ohm, 2-watt Resistor
1—30,000 ohm, 1-watt Resistor
5—5000 ohm, ½-watt Resistor
2—15,000 ohm, ½-watt Resistor
4—250,000 ohm, ½-watt Resistor
3—500,000 ohm, ½-watt Resistor
Ohmite Manufacturing Company
1—7500 ohm "Brown Devil" 10-watt Resistor
Readrite Meter Works
1—TM108, 0-7 MA Meter, arrow left, window down
6—1¼" Black Bar Pointers
McMurdo Silver Corporation
1—4 Gang 200 mmf. "Low Min." Condenser
1—Kit of 4 A-B-C Coils (2 R.F., 1st Det. and Osc.) 4 D Coils, (2 R.F. 1st Det. and Osc.)
1—17F B.O. Coil
1—17G Crystal Auto. Transformer and Shield
6—Shield Cans
2—10 mh. R.F. Chokes
8—Tube Shields
1—A-A-G Binding Post Strip
1—Set 12 Am. Phenolic High-Q Sockets with eight tube shield bases (4-6D6, 1-6C6, 1-42, 1-6B7, 1-5Z3, 2-76, 2 5-pin blank)
1—AC Cord and Plug
1—AVC On-Off Switch
1—Kit of Hardware
Sprague Products Company
1—475V. 16 mf. Wet Condenser
1—250V. 18 mf. Self-Regulating Electrolytic Condenser
1—300V. 12 mf. Self-Regulating Electrolytic Condenser
7—TC15 .05 mf. 600-volt Condensers
1—TC5 ½ mf. 600-volt Condensers
7—TC11 .01 mf. 600 volt Condensers
1—HC5 5 mf. 25 volt Dry Electrolytic Condenser
5—TC1 .1 mf. 600 volt Condensers
Steel Box and Display Company
1—Radio-Silver polished chromium Pierced Chassis, Gang Condenser Shield, 4 Partitions and bottom shield
Yaxley Division, P. R. Mallory Company
1—N 500,000 ohm Volume Control
1—0.1 megohm Tone Control
1—G 10,000 ohm Sensitivity Control
1—704A Junior Jack (4 spring, single closed circuit and single filament circuit)
1—SP07488 Locating Plate, 5 position, 9" flat shaft
5—SP07488 2 Circuit, 5 position Plates
8—SP07488 ½" Spacers
1—No. 9 Switch
Filtermatic Manufacturing Corporation
3—50 mmf. Isolantite-Mica Fixed Condensers
5—250 mmf. Isolantite-Mica Fixed Condensers
1—.004 mf. Isolantite-Mica Fixed Condensers

List of Accessories

Bliley Piezo Electric Company
1—465 kc. Type B C Mounted Crystal
Raytheon Production Company
4—6D6 Tubes
1—6C6 Tube
1—6B7 Tube
1—76 Tube
1—41 Tube
1—42 Tube
1—5Z3 Tube
Jensen Radio Manufacturing Company
1—C8X Speaker with 7000-ohm Transformer, field 495 ohms, 110 M A



Another view of the Silver Super-het.

1935 ad

RADIO'S REAL THRILL IS "DX" RECEPTION!

SARGENT Receivers have an enviable reputation for bringing in long distance.

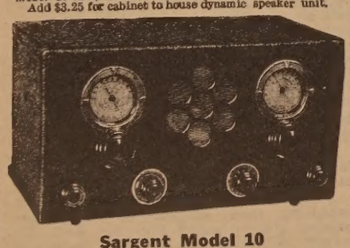
MODEL 20 will satisfy the demands of the most discriminating amateur and short wave listener. Designed for utmost circuit efficiency, complete shielding, circuit isolation, we are able to offer a receiver without "frills" but with everything that really counts in outstanding performance, and at a price the average purchaser can afford.

MODEL 20 has Pre-Selection, Optional A.V.C., Calibrated, continuous Band Spreader, Coil Switching.—NO PLUG-INS,—Built-in Power Pack. Marine Model 20-MA is a knockout on 600 meters and higher. Extremely high efficiency on the short waves. If you wrote your own list of features a receiver should have, you would find MODEL 20 would fit the description.

IMMEDIATE DELIVERY. ORDER YOURS TODAY

Model 20-SA, 15-550 Meters, Complete.....$59.50
Model 20-MA, 15-1500 Meters, Complete.....$67.50
Add $3.25 for cabinet to house dynamic speaker unit.

Sargent Model 20



Sargent Model 10

Never before has a value been offered to match the MODEL 10. It uses the popular circuit with one stage tuned r.f., regenerative detector and two audio, —5 tubes including rectifier. Model 10 covers 15-550 meters, or 15-1500, is an excellent broadcast band set, has continuous band spread, separate band spread dial, coil switching.—NO PLUG-INS,—built-in power pack, Jensen Speaker. A high grade communication type receiver ideal for shipboard, amateur or short wave listener use.

MODEL 10-SA, 15-550 Meters, Complete.....$34.50
MODEL 10-MA, 15-1500 Meters, Complete.....$39.50

Special models, to order, covering any tuning range from 15 to 15,000 meters. D.C. and Battery prices on request. IMMEDIATE DELIVERY.

E. M. SARGENT CO.
212 Ninth St. Dept. S Oakland, Calif.

1975 ad

PUETT ELECTRONICS

1975 AD

P.O. BOX 28572 DALLAS TEXAS 75228

SEND A SELF-ADDRESSED STAMPED ENVELOPE FOR OUR NEW ACQUISITIONS LIST - 01A, 99 and other hard to get tubes.

ANNOUNCING THE NEW CLASSIC RADIO NEWSLETTER FOUR PAGES, SIX ISSUES PER YEAR, $5.00 PER YEAR. STARTS JAN. 1975.

SILVER GHOSTS

BY JWF PUETT

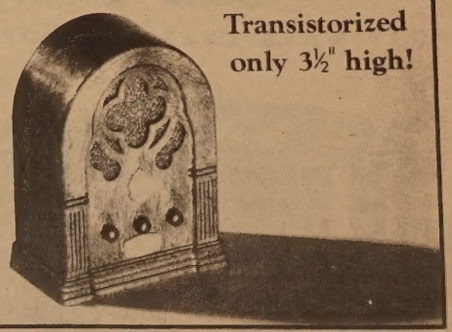
PHOTOGRAPHS - SCHEMATIC DIAGRAMS-STORIES OF EVERY KNOWN RECEIVER MANUFACTURED BY THE EH SCOTT RADIO LABORATORIES $10.00

WE ARE SLOWLY BUT SURELY RECEIVING MORE ORDERS FOR SILVER GHOSTS. WE HOPE TO GO TO PRESS WITHIN FOUR TO SIX WEEKS. THANK YOU FOR YOUR PATIENTS.

you'll have fun with this....

Old Time Radio

Transistorized only 3½" high!



OLD TIME TRANSISTOR RADIO

ONLY **9.90** Postpaid

Remember the good old days . . . when everyone sat around the parlor listening to the radio? This is a miniature copy of that famous cathedral-style old-time radio and measures 3½ x 1½". Our model has five transistors and two diodes and comes in handsome woodgrain plastic case. A wonderful piece of nostalgia. Uses one 9-Volt battery which is included. Each comes gift-boxed.

WALTS EMPORIUM

P. O. BOX 19406 DALLAS, TEXAS 75219
EVENINGS - 214-262-7855

Club News

SAN FRANCISCO BAY AREA CHAPTER OF THE AMERICAN PHONOGRAPH SOCIETY

"A good time was had by all," was the comment of those in attendance of a local chapter meeting. It was ladies night and Al Sefl past president of the Society, showed the Edison movie "The Great Train Robbery."

Art Wilmoth and Ed Linolti each demonstrated a phonograph at the meeting.

The above news came from the Newsletter of The American Phonograph Society, Box 5046, Berkeley CA 94705.

THE SOUTHWEST VINTAGE RADIO AND PHONOGRAPH SOCIETY

This Society has achieved goals since its first meeting in 1974.

It has regular meetings, operating capital, events, lectures on the restoration of the oldies, monthly newsletter and the companionship of others interested in the hobby.

The Society is planning an event in 1976 which will include a contest of radios and phonographs. Mel Zemek and John Rawlins on the program committee are making plans for this event and the Society expects collectors and historians to come from all areas of the southwest region (5th district). Others are also invited.

John Alford at the last meeting demonstrated how to refinish plastic panels. He stressed the importance of using 0000 steel wool. And he described the benefits of using rotten stone and pumice powder, all of which are sbsilable at most hardware stores. All rubbing is done in straight strokes to prevent swirling. He also showed how to fill engravings on knobs and panels with an artist painting knife. The Horn Speaker is planning a comprehensive article on panel restoring.

The Society can be contacted by writing to S.V.R.P.S., Box 19406, Dallas, Texas 75219.

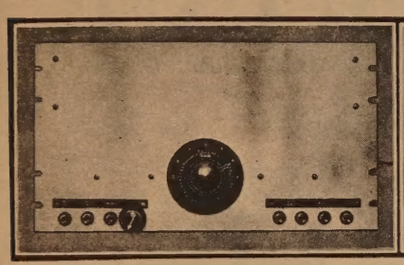


Fig. A
A typical commercial mixer panel.

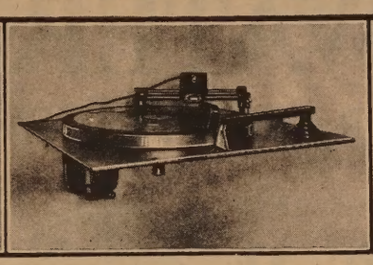


Fig. B
A commercial recording turntable.

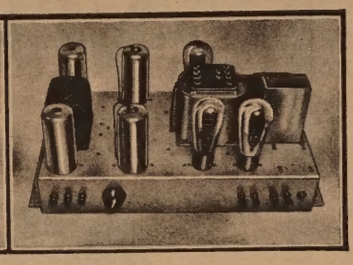


Fig. C
An amplifier suitable for recording.

SOUND RECORDING AT 33-⅓ R.P.M.

RADIO-CRAFT for AUGUST, 1932

By GEORGE J. SALIBA, S.B.

RECENTLY, a great deal of experimental work has been done in instantaneous recording on 33-1/3 R.P.M. or *slow speed* records. These slow speed records have many practical applications, especially in the recording of radio programs, and a number of radio stations are now using this method.

In the past, the station had no comeback if the sponsor claimed that his program was not put over as agreed upon, but now, the station takes the recorded program from its files, plays it back and so settles the disagreement.

Comparative Playing Time

Commercial types of sound recording equipment now available to the home recordist and designed for 33-1/3 R.P.M. operation are illustrated in Figs. A, B and C.

One 16-inch, 33-1/3 R.P.M. disc plays for 15 minutes; it contains a half hour's program if both sides are used. This long playing time appeals to those artists who keep their own files. Heretofore, it has been the custom to use 12-inch, 78 R.P.M. records, but since these play for only four minutes, three of them are required for a fifteen minute program. Continuity is maintained by fading from one record to another, and often this fading is necessary at a vital part of the program much to the chagrin of the artist. The 16-inch record overcomes this objection.

Recording at 33-1/3 R.P.M. entails more problems than at 78 R.P.M. In Table I are given the tangential velocities of 78 R.P.M. and 33-1/3 R.P.M. records.

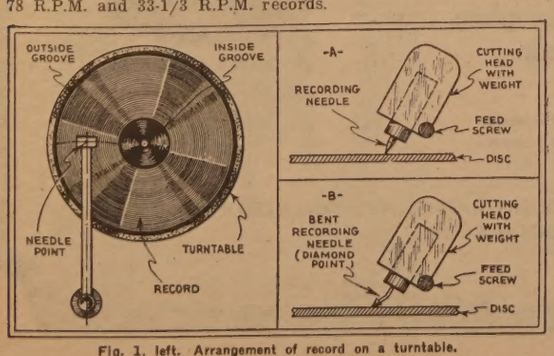


Fig. 1, left. Arrangement of record on a turntable.
Fig. 2, right. Two types of recording needles.

TABLE I

Location of Groove	Tang. Velocity—Ins. per Sec. (78 R.P.M.)	(33-1/3 R.P.M.)
Inside	16.25	13.5
Middle	31.5	20.5
Outside	46.5	27.5

Since the needle speed is much lower on the slower speed records, the recording and reproducing problems are increased; consequently, as the speed of the needle is lower, the track available for recording will be shorter. It is difficult to make good recordings on the inside of the record because of decreased velocity. This is especially true in reproducing high frequency modulations; for the lower the frequency, the greater will be the amplitude—the frequency varying in inverse proportion to the amplitude. Therefore, high frequencies are recorded with very little amplitude, but this small amplitude represents considerable energy, and no difficulty is experienced in reproducing these modulations if the needle is sharp.

When a needle is new, it does its best work, and for this reason the 33-1/3 R.P.M. records are always started from the inside. The diameter of the inside or starting groove should not be less than 7½ inches; a smaller diameter would be detrimental to good quality.

Position of Pickup

The proper placing of the pickup is also very important to good reproduction. Heretofore in 78 R.P.M. recording, it has been the custom to place the pickup so that the needle hits the exact center of the turntable. Because of the comparatively short radius of the record, this is considered the correct position, but for 16-inch records, *this rule does not hold.*

In recording, the cutting-head is guided in a straight line across the face of the record. Obviously, the correct way to reproduce such a record is to have the reproducer travel straight across the face of the record. This would necessitate the use of a feed screw, which is not practicable for commercial purposes. In the placing of the 78 R.P.M. pickup so that the needle hits the center of the turntable, straight-line reproduction is approximated because the arc obtained is almost equal to its chord. If we now take a 16-inch record and place the pickup in the same location, we note that from the start to the end, the arc described has a comparatively short radius and therefore is not equal to the chord, i.e., the plane of the

(*Continued on page* 112)

armature is not perpendicular to the plane of the record, and as a result, fidelity of reproduction is not obtained. The pickup should be placed as shown in Fig. 1.

Surface Noise

In 33-1/3 recording, surface noise is more pronounced than at the higher speed. The frequency of this scratch is in the neighborhood of 3,600 cycles and for this reason is more objectionable. In commercial recording, this surface noise has been diminished considerably by improving the record material, but in instantaneous recording, no determined effort has been made to overcome it. The use of a scratch filter is not recommended; if one were used, every frequency above 4,000 cycles would be eliminated, and the record would lose its brilliancy. In the use of aluminum, this noise becomes especially objectionable near the periphery of the record.

Scratch in recording is due to two things. First, the hardness of material used, and second, the angle the diamond needle makes with the record. Aluminum should be of medium hardness and should be well lubricated or waxed. If the material is too hard, the needle will rip and tear the record and terrific surface noise will result; if it is too soft, the danger of destroying the record will be increased. It is a good policy, after purchasing a ready-made 16 inch recording disc to go over it with a piece of waste that has been soaked in wax. The disc must be spotlessly clean, and when cleaning, soft cheesecloth should be used.

In Fig. 2A is shown how a steel recording needle normally sets in the cuttinghead; note the steep angle that it makes with the record. If a diamond needle is used, the shank should be bent to the position shown in Fig. 2B, so that the sides barely clear the record. Steel needles are made of hardened metal which cannot be bent, but the shanks of diamond needles are made of soft metal, and bending is a simple matter. See that the point of the needle is not too sharp; otherwise, it will tend to cut the record instead of *compressing* it.

Good 33-1/3 R.P.M. records can be made if care and patience are exercised, and the recordist should not be too easily discouraged if his first trials are unsatisfactory.

Home Talkies

As stated before, the fields for slow-speed instantaneous records are developing rapidly, and the most interesting one is home talkies. Considerable work has been done on the sound-on-disc method, and in the near future such a machine will be marketed for use by the amateur. While no material is available for publication on this apparatus, the mechanism is quite simple.

From the turntable motor a flexible coupling is brought out which connects to the camera. In making the sound picture, the film is marked with a punch, and a corresponding mark is made on the record. The recording head is then placed on this mark and the section of film with the hole is placed in the aperture. The switch is then thrown and the action started after a few seconds have elapsed to allow the motor to reach operating speed. In showing the picture, the film is placed in the projector with the punched hole in the aperture, the pickup is placed on the "start" mark, and then the motor is started.

When the film breaks, each frame, preparatory to the patching, should be replaced with a blank frame. This protects against the loss of synchronism.

The question of playback needles is another serious problem in reproducing from 33-1/3 R.P.M. aluminum records. The fibre or thorn needle, unless treated, wears out before the end of the record is reached. To prolong the life of these needles, some manufacturers have impregnated the needle with bakelite or shellac, and it is surprising how much longer these needles last. Where a fibre needle barely finished one 12-inch 78 R.P.M. record in good condition, it is now possible to play four of them without resharpening the needle. This means that the needle will now easily last through a fifteen minute, 33-1/3 R.P.M. record.

Notes On the WD-11 Tube

Radio News for March, 1923

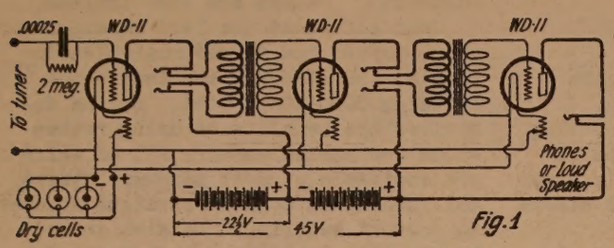


Fig. 1

A Standard Detector and Two Stage Amplifier Unit Using WD-11 Tubes. Three Dry Cells Connected in Parallel Supply the Filament Current.

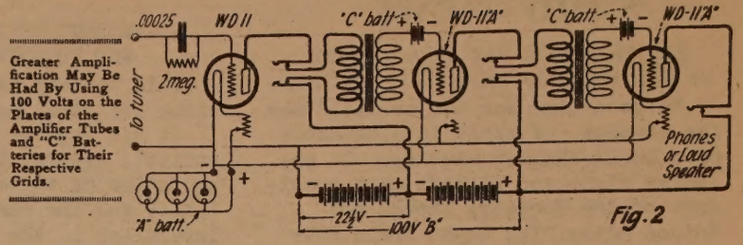


Fig. 2

Greater Amplification May Be Had By Using 100 Volts on the Plates of the Amplifier Tubes and "C" Batteries for Their Respective Grids.

PRIOR to the introduction of the Westinghouse WD-11 tubes, there were a number of tubes of the six-volt "A" battery variety obtainable. These varied in their characteristics. Queer as it may seem, no doubt was manifested as to the use of particular circuits. Truly, there was no necessity for this, as the circuit constants were the only important factors. However, with the marketing of the WD-11 tubes, there appeared a universal question mark. Radio editors were swamped with queries as to the circuits adaptable to this tube. For some unknown reason, the radio public is still being bamboozled into believing the necessity of special circuits. "WD-11" hook-ups are still being published.

A few notes on this so-called "Peanut" tube should eradicate present standing illusions. Aside from the use of but 1½ volts for heating the filament, there is practically no difference in the characteristics of this tube and those of the six-volt type. It is a high vacuum receiving tube and was designed for use as a detector or audio frequency amplifier. It is an excellent oscillator for small outputs such as are used for heterodyne or beat reception. The filament is oxide coated and is rated at 0.25 amperes at 1.1 volts or 0.275 watts. Ample electronic emmission is obtained from the filament at this rating. Higher voltage is not only undesirable but will prove harmful to the filament. Any standard detector circuit with grid leak and condenser is satisfactory. The values of the grid leak resistance and grid condenser capacity are not critical but a grid leak of two megohms and a condenser of .00025 M.F. is recommended. The normal plate voltage when used as a detector is 20 volts. If a voltage above 20 is available, up to 40 volts may be used with slightly increased signal strength. For operation as an amplifier, the characteristics of this tube are such that no negative grid potential is necessary. However, should a greater output be required as in the operation of a loudspeaker, a negative grid potential may be needed. This should be approximately negative three volts with 100 volts between the plate and filament. The impedence of this tube from 30 to 100 volts is approximately 20,000 ohms, which is sufficiently low for satisfactory amplification with standard transformers. Any standard make of apparatus can be used. These tubes may be used with any detector and amplifier unit, without any changes in connections.

Since three tubes are used in this case, it is required that three dry cells connected in parallel be employed as shown in Fig. 1. With this connection, the same voltage is obtained but the total amperage capacity is increased.

One dry cell should be used for each tube employed. Connect the cells in parallel, never in series. The center dry cell posts are positive. They are shown reversed in Figs. 1 and 2.

Where a greater amplification is desired, using 100 volts on the plates of the Amplifying tubes, a small three-volt flash-light battery should be connected with the negative terminals to the grid of each as in Fig. 2.

For the benefit of beginners, we will run a series of articles concerning layouts of apparatus and their circuits with the WD-11 tube in evidence.

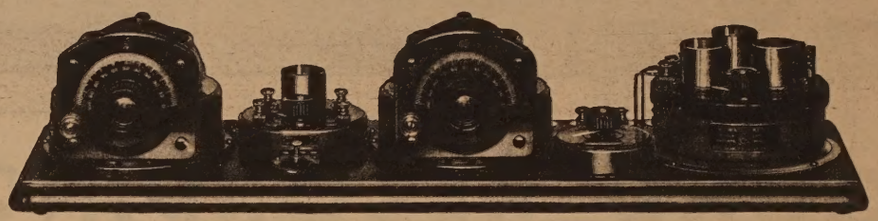
1923 ad

RADIO MAILING LISTS

12,400 Radio Dealers, covering U.S. by States.. per. M. $7.50
1,614 Radio Manufacturers, covering U.S. by States per list 15.00
1,757 Radio Supply Jobbers, covering U.S. by States per list 15.00
260 Radio Stations .....per list 4.00
257 Mfrs., who make and assemble complete Radio Sets .....per list 4.00
25,000 Radio Amateurs and Managers of Radio Stations .....per M. 7.50
Ask for price list covering Canada and England.
Above ready to send on receipt of remittance.
Trade Circular Addressing Co., 166 W. Adams St., Chicago

1924 ad

ATWATER KENT
RADIO EQUIPMENT



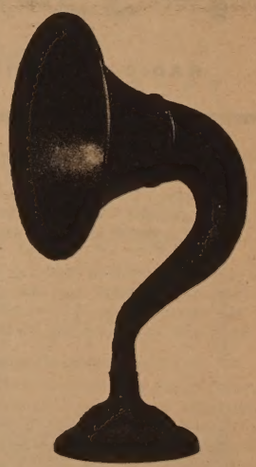
Atwater Kent Model 9 Receiving Set

ATWATER KENT Receiving Sets are a truly remarkable achievement. Their wide range of operation; the volume and clearness of tones obtained from distant points, together with the ease with which desired broadcasting stations can be tuned in are the outstanding features of their unusual performance.

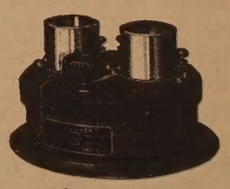
The ATWATER KENT Loud Speaker will give you a new conception of clear reproduction:—the true gift of the broadcasting artist is brought undistorted into your home.

If you are now working with a one-tube set, the ATWATER KENT 2-Stage Amplifier will give you the necessary volume to use a loud speaker.

ATWATER KENT Radio Equipment includes complete sets and every instrument necessary for the assembling of complete sets from tuning unit to loud speaker.



The Atwater Kent Loud Speaker

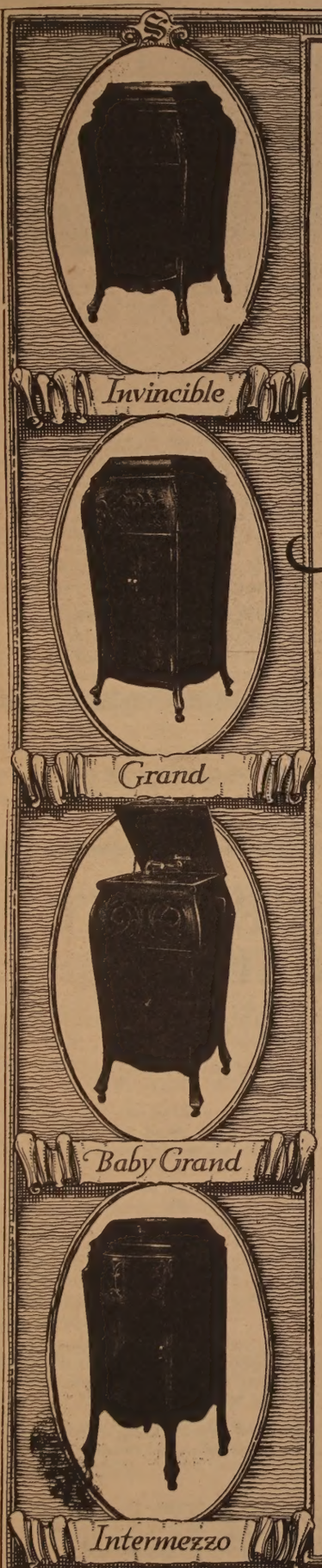


2-Stage Amplifier

Literature describing the entire line of Atwater Kent Radio Sets and Parts sent on request

ATWATER KENT MANUFACTURING COMPANY, PHILADELPHIA, PA.
4943 STENTON AVENUE

The HORN SPEAKER..... 9820 Silver Meadow Drive, Dallas, Texas 75217



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YOU will be proud to own this magnificent instrument, internationally famous as the finest phonograph made. The Sonora is noted for its graceful lines, for its important and exclusive features of construction, for its ability to play all makes of disc records perfectly without extra attachments, and for its superb tonal qualities.

AT the Panama Pacific Exposition in 1915 "the only jury which heard and tested all the phonographs exhibited, recommended that the Sonora Phonograph be given a marking for tone quality higher than that given to any other phonograph or talking machine."

And the tone of the Sonora today has been still further improved. From a complete line you can choose just the Sonora you want at just the amount you wish to pay.

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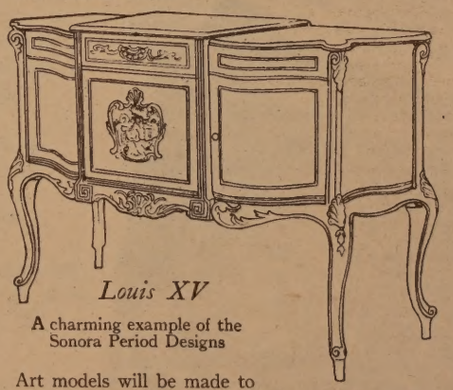
THE Sonora Period Models are wonderful reproductions of classic designs. It has never been forgotten by Sonora, however, that no matter how beautiful a cabinet may be, in a phonograph the merit lies in the perfection of the *musical instrument*, and with *tone* most important.

Styles now ready include Gothic, Chippendale, Chinese Chippendale, Louis XV, Louis XVI, William and Mary, Jacobean, Adam, Colonial and Duncan Phyfe.



Louis XV

A charming example of the Sonora Period Designs

Art models will be made to order to suit any taste. Complete equipments also, will be furnished. Correspondence is invited.

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GEORGE E. BRIGHTSON, President

Executive offices:- 279 Broadway, New York
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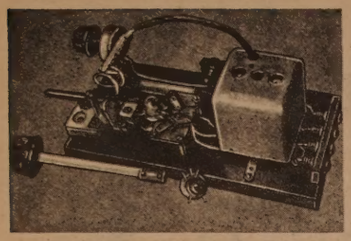
Export Department: 417 West 28th Street, New York, U. S. A.

To get the best results use only the new Sonora Semi-Permanent Silvered Needles with Steel Needle Records



Transmitter Using Acorn Tube

Austrian ½-Meter Transmitter

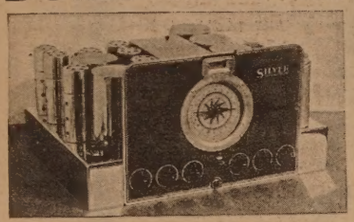
● THE latest issue of *Radio Welt*, published in Vienna, contained the picture of a ½-meter transmitter using the new "Acorn" tube made in the U.S.

This transmitter, coupled to a suitable dipole or Lecher wire system makes a very practical unit for sending out these micro waves.

While the circuit for this unit was not given in the article, the application of this American tube, in Europe, is of technical interest.

1935 ad

BUILD THIS 10-TUBE PROFESSIONAL SUPERHET AND SAVE OVER 50%



HERE'S the latest in high-frequency superhets—one that you can assemble, test and align in one evening at home. It's fun to build . . . you'll save money . . . and boy, will you get a kick out of its amazing performance!

9 to 200 Meter **SILVER** HIGH-FREQUENCY SUPERHETERODYNE

This new SILVER Superhet—designed by McMurdo Silver, Frank Jones and fifteen leading manufacturers—brings you

- Two tuned r. f. stages on all four bands.
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- Sensitivity 1 microvolt and better.
- Selectivity just what you want—variable 50 cycle to 10 kc.
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- No inherent circuit or tube noise—lets you copy signals now lost in noises.
- Wired with made-up color coded cable—requires no circuit tracing, or even a diagram.

START FOR AS LITTLE AS $7.30 BUY THE PARTS AS YOU BUILD!

The 32-page "HOW TO BUILD IT" Book (sent for 10c, stamps or coin) tells the whole story of 1935's outstanding communication receiver. You can build and align it in a few hours . . . or you can buy its standard parts from your local jobber as you build, if you haven't already got many of them. Now is the time to get ready for the new DX season.

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SEND 10c FOR 32-PAGE BOOK "HOW TO BUILD IT"

R-S MERCHANDISING COMMITTEE
1711 Roscoe Street Chicago, Ill., U. S. A.

1920 ad

Aug 2, 1920

WIRELESS! A real radio station for your boy

Encourage your boy in scientific study. Let him install a wireless station at home—a real wireless, not a toy. With a No. 4006 Gilbert Receiving Set he can have his station completely assembled in an hour and be listening to the messages of Government and commercial stations and many amateur stations all over the country. It's fascinating. It's instructive. It opens great possibilities to any boy.

4006 Set $12.50 (in Canada $18.75)

Gilbert Radio outfits are right up-to-date, designed by an expert, a wireless officer of the U. S. Army during the war. The Wireless Book in each outfit tells the location of the Government stations—when they send messages—how to receive them. It gives the wireless code. And the powerful Gilbert station at New Haven sends messages to boys every day.

Write today for our special Radio Catalog and name of the dealer who sells these outfits in your city.

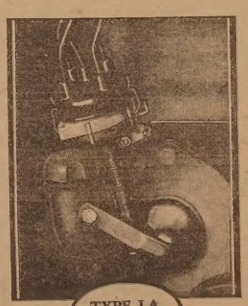
The A. C. Gilbert Company
119 Blatchley Avenue, New Haven, Conn.
In Canada: The A. C. Gilbert-Menzies Co., Limited, Toronto
In England: The A. C. Gilbert Co., 125 High Holborn, London, W.C.1

After reading the first line of the copy in the Atwater Kent ad, I am curious to know what he manufactured in 1900.

1927 ad

ATWATER KENT IGNITION *for Fords*

The name assures its performance



TYPE LA Price $10.80 Including Cable and Fittings

FOR twenty-seven years "Atwater Kent" has stood for advanced electrical engineering and absolute precision of manufacture. These qualities, which have won leadership in Radio, explain the sensational performance of Atwater Kent Ignition for Fords. This remarkable scientific ignition system will literally make a new car of your Ford—smoother, snappier power, easier starting, amazing hill climbing.

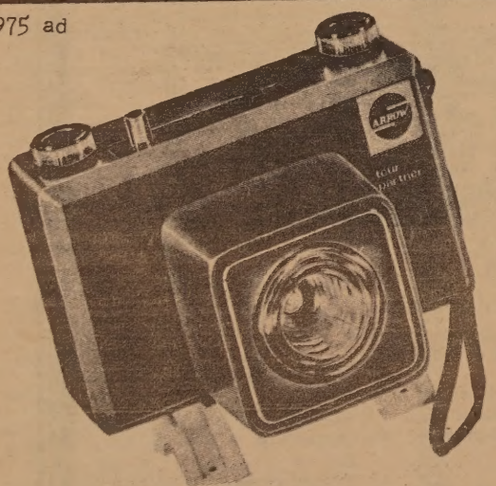
Installed in an hour. The low price of $10.80 includes cables and fittings. Get facts from your service station or write to

ATWATER KENT MFG. COMPANY
A. Atwater Kent, *President*
4853 Wissahickon Ave. Philadelphia, Pa.

Makers of

ATWATER KENT RADIO

1975 ad



MULTI-PURPOSE Bike Radio, consists of a solid-state AM radio, headlight and signal horn. Fits on handlebar of bicycle and comes with 2 flashlight batteries, bracket, screws and instructions. Unique and useful for bike rides .....perfect for beach, camping, picnics, sporting events, etc. Easy locking device permits user to install or remove in seconds, yet makes theft difficulty. Shipping weight 8 pounds, shipping size 13 X 9 X 6 inches. Comes post paid. Send $19.95 to Coe Enterprises, Dept. 1026, Box 259, Coe Drive, Mesquite, Texas 75149.

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Photo ads: $2.00 extra.

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PHONOGRAPH COLLECTORS, join the American Phonograph Society. Receive the quarterly Journal and four Newsletters. Receive free reprints and stereoscopic phonograph cards. For more information send 10¢ stamp. For one year membership, send $6.50. The American Phonograph Society, P.O. Box 5046, Berkeley CA 94705.

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GET THE ORIGINAL look and sound from that old Radio or TV. Contact Fred Geer Restoration Artist, 6042 Brookridge Rd., Jacksonville Fla. 32210. Phone: 904 771-7828.

FOR SALE OR TRADE

FOR SALE: Riders Manuals (Radio) Volumes 4-13, 15 & 16 $8. each and abridged volume 1-5 $10. Good condition: Modern Radio Servicing, Ghirardi First Edition 1935 fair condition $8: Elements of Radio Telephony, William C. Ballard, Jr. First edition 1922., good condition $7. Postage extra on all prices; RCA 100 Speaker, speaker cloth not original, works $15. plus postage. Lee & Carolyn Bruton, 16500 W. 12th Dr., Golden CO 80401. Phone: 303 278-2646.

FOR SALE: Brand new in original carton a pickup reproducer for an Edison Disc Phonograph, made by Jewel Phono Parts Co. of Chicago, $25.00. Also UX-201A tubes, pear shaped at $6.50 each. Dan Gaidosz, 342 West Riverroad, Orange, Conn. 06477.

FOR SALE OR TRADE: Early QST's, CQ's, Radio call books, handbooks, tubular Audiotrons, Electron relays and early receivers & parts. Erv Rasmussen, W6YPM, 164 Lowell St., Redwood City, California 94062.

FOR SALE: List of antique parts, sets and equipment. SASE please for list. Rita Hale, 101 Union Street, Norfolk, Mass. 02056.

FOR SALE OR TRADE

HAVE SEVERAL RADIOS FOR TRADE: Grebe CR9, two Trio Radio Lab crystal sets, Sunnyvale Radio Shop three tube set type A and a DeForest tuner T200 1919. Also have some radios for sale and many parts, tube sockets and RF transformer tuning capacitors and radio related instruments for sale. Send for my complete list. Jim Cirner, 13366 Pastel Lane, Mountain View, Calif. 94040, Pho: 415 967-7672.

CLOTH COVERED POWER CORD. New 2-conductor cord as used on AC sets of the twenties, thirties, forties. From old stock, limited quantity. In brown or gold 25¢/foot. Please add 50¢ for mailing. Warren Dewey, 5021 Ambrose Ave., Los Angeles, California 90027.

FOR SALE: 16" transcription A.R.F. 10 for $20.00, have about 200. Also tubes, no box as is 20 for $1.00 no special number take as come. Emmett A. Smith, 2706 Cub Hill Rd., Baltimore Md 21234.

WD11 Adaptors, use UX199, 120, VT24. No wiring changes, Radiola III's battery hook-up included $5.25pp., 2 for $9.25. Keith Parry, 17557 Horace St., Granada Hills CA 91344.

FOR SALE; Best offer only, Classic McMurdo Silver "Masterpiece 5," Speaker, power supply and console cabinet. Sorry, pick up only as whole set much too heavy and big to ship. Alley, 48 Judson Street, Raynham, Mass. 02767.

FOR SALE: Radio Horns. Baldwin $30., Kellogg $35., Silvertone $30., Radiola UZ-1325 $35., works. Purchaser pays shipping. Arthur Harrison, 1021 Falcon Drive, Columbia MO 65201.

FOR SALE: Solid State power supplies for operating battery radios. G. B. Schneider, 6848 Commonwealth Blvd., Parma Hgts., Ohio 44130.

SEND $1.00 for the newly published booklet "A Pocket Guide to Antique Radio Collecting." Antique Radio Press, Box 42, Rossville, IN 46065.

FOR SALE: Original folder for Mohawk one dial radios, 1926-1927. $1.00 plus SASE. Alvin Heckard, RD 1, Box 88, Lewistown PA 17044.

FOR TRADE: 50 issues from July 1930 to June 1934 of Radio News. M. Johnston, 5317 Lawton, Oakland, Calif. 94618.

FOR SALE: Battery sets-miscellaneous. Large SASE for list. Rick Ammon, Box 104, Mt. Carmel, Ill. 62863.

Miscellaneous

DON'T DIE without a WILL!
Blank will form protects your family. Only $2.00 guaranteed. Order today! COE Enterprises, Box 259, 75 Coe Dr., Mesquite, Texas 75149.

WANTED

WANTED: Radiola 100A Speaker, will buy or trade. Rick Wilkins, 704 St. Lukes Drive, Richardson TX 75080.

WANTED: 1936-1937 RCA All Wave Magic Brain radio table or console. Models: 15K, 13K, C13-2, C15-4, 10K, 10T, 9K2 and 9T complete console or chassis only working condition or as is. Dave Freidinger, 1019 N. 29th., Omaha, Neb. 68131.

WANTED: RCA service notes for TRK-12, TRK-120 TV receivers; bound volumes 1923-1928, 1934-1946, 1949; complete yearly sets 1951-1964. Also RCA spec sheets, sales literature, customer instruction books for radios, phonos, TV's, any year up to present, esp. for TRK-12, TRK-120, 630-TS, CT-100. Also booklet "Practical Television by RCA." Also need original looseleaf binders for service data or spec sheets. C. Sarver, 256 West 88th Street, N.Y. NY 10024.

WANTED: AK 20 compact without cabinet, speaker for Pooley cabinet, Crosley audio transformer for Model 52, base & driver for Brandes & Magnavox Horn Speaker, information on Tri-City Electric Supply Co., volume control rheostat and face plate that says volume control for Grebe MV1, information as to the design of cabinet for (1) Meteor 3 tube 199's made by The Radio Shop & (2) Meteor 5 tube set (01A's). Lee & Carolyn Bruton, 16500 W. 12th Drive, Golden CO 80401. Phone: 303 278-2646.

WANTED: Service information for JACKSON tube tester model 115, Ser. # X05381. I will accept a Xerox or other type copy of the above. Will buy or trade. Scott Brissey, 414 Bloom, 1st Floor, Highland Park, Ill. 60035.

WANTED: Microphones, pre-1940, also literature. Have old radios, tubes, parts and mics. to trade. Bob Paquette, 443 N., 31St. Milw. Wis. 53208.

WANTED: Crystal sets, battery and electric radios and televisions Mfg. before 1935. Need all related items. Will buy one set or complete collection. Young, 11 Willow Court, Totowa, N.J. 07512.

WANTED: Radio - all 1920, 1921, Oct. 1922. Many wireless age 1920, 1925, Q.S.T. Feb, March 1920. Radio Craft Aug. 1929, Feb. 1931. Thompson, 2930 Delavina, Santa Barbara CA 93105.

RADIO items and toy trains wanted. Write Box 161, West Hurley, N.Y. 12491.

WANTED: Radio parts and magazines 1920s. Trade 2 Saturday Evening Post 4-12: National Geographic 8-18, 4-23. WANT BAKELITE PANELS. W6ME, 4178 Chasin Street, Oceanside CA 92054.

WANTED: Paragon DA-2 Amplifier parts. Pre-1923 wireless "ANYTHING!" Rick Ammon, Box 104, Mt. Carmel, ill. 62863.

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PUETT ELECTRONICS

P.O. BOX 28572 DALLAS TEXAS 75228

PUBLISHERS OF

THE CLASSIC RADIO NEWSLETTER

LIST NO. 12

HOW TO ORDER

(1) Make checks and money orders payable to PUETT ELECTRONICS.

(2) Please state whether new or used tubes are desired and whether a half-price used tube is desired when a new tube is out of stock. REFUNDS are mailed with your invoice for out-of-stock tubes, or when, by customer request, a used tube is substituted for an out-of-stock new tube.

(3) ALL ORDERS ARE SHIPPED PARCEL POST. NO C.O.D. INCLUDE 15% FOR POSTAGE AND HANDLING. INSURANCE RATES ARE 30¢ FOR ORDERS UNDER $50.00. TEXAS RESIDENTS ADD 5% STATE SALES TAX.

MINIMUM ORDER $3.00

CUSTOMER SATISFACTION GUARANTEED - If you are not satisfied with your order for any reason, tubes may be returned within ten days for refund or replacement with exception of tubes which are shorted or have open filaments. It will be assumed that returned tubes with open filaments or shorts were damaged in shipment. Shipping damage claims will be handled promptly through the post office on insured orders. PUETT ELECTRONICS assumes no liability for orders which are not insured, and no liability beyond that which is covered by postal insurance. ALL TUBES ARE THOROUGHLY TESTED ON A MUTUAL CONDUCTANCE TUBE CHECKER BEFORE SHIPMENT.

SCHEMATIC DIAGRAMS

WE CAN FURNISH SCHEMATIC DIAGRAMS AND TECHNICAL DATA ON ALMOST ANY RADIO FROM 1920 TO 1954 FROM OUR LIBRARY OF ORIGINAL MANUFACTURERS SERVICE DATA. Send a self-addressed stamped envelope and $1.50 per radio set. This offer is limited to five photocopied pages. If the data on your set exceeds five pages, we will send you a quote. State mfg. & model number.

THE CLASSIC RADIO NEWSLETTER
E.H. SCOTT & McMURDO SILVER:
Send a self-addressed stamped envelope for a sample issue. Send 30¢ in stamps plus a self-addressed stamped envelope for our list of classic radio literature. We sell, buy & trade classic radio literature.

TYPES 01A, 99, WD-11, etc.
We sometimes have these tubes in stock in very limited quantities. Send a self-addressed stamped envelope for information.

BALLAST TUBES - We can supply many types of ballast tubes or their equivalents. Send a self-addressed stamped envelope with your inquiry.

OLD RADIO TECHNICAL BOOKS - Send a self-addressed stamped envelope.

TABLE 1 - OLDER TYPE-NUMBER TUBES Prices listed for new tubes. Used tubes are half new tube price.

0A2	$2.	1LE3	$4.	5Y4	$3.	6F6	$3.	6U7	$4.	7Z4	$3.	14B5	$3.	35W4	$2.	81	$6.	5654	$2.
0A3	$2.	1LF3	$4.	5Z3	$3.	6F7	$6.	6V6	$2.	10	$6.	14B6	$3.	35Y4	$3.	82	$3.	5686	$3.
0A4	$2.	1LG5	$4.	5Z4	$3.	6F8	$3.	6V7	$4.	12A5	$4.	14B8	$3.	35Z3	$3.	83	$3.	5691	$3.
0B3	$2.	1LH4	$4.	6A3	$5.	6G5	$4.	6W6	$3.	12A6	$3.	14C5	$3.	35Z4	$3.	83V	$3.	5703	$3.
0C3	$2.	1LN5	$4.	6A4	$6.	6G6	$3.	6X4	$2	12A7	$4.	14C7	$3.	35Z5	$3.	84	$3.	5749	$2.
0D3	$2.	1N5	$4.	6A5	$4.	6H6	$2.	6X5	$2.	12A8	$3.	14E6	$3.	35Z6	$3.	85	$3.	5751	$2.
0Y4	$3.	1N6	$4.	6A6	$4.	6J5	$3.	6Y5	$3.	12AH7	$3.	14E7	$3.	36	$3.	89	$3.	5814	$2.
0Z4	$2.	1P5	$4.	6A7	$5.	6J6	$2.	6Y6	$2.	12AT6	$2.	14F7	$3.	37	$3.	117L7	$4.	5879	$2.
1A1	$5	1Q5	$4.	6A8	$3.	6J7	$2.	6Z7	$2.	12AT7	$2.	14F8	$3.	38	$3.	117M7	$4.	5881	$2.
1A3	$3.	1R5	$2.	6AB4	$3.	6J8	$3.	6Z4	$3.	12AU6	$2.	14N7	$3.	39	$3.	117N7	$7.	5992	$2.
1A4	$3.	1S4	$2.	6AB7	$3.	6K5	$3.	6Z5	$2.	12AU7	$2.	14V7	$3.	40	$6.	117P7	$7.	6080	$3.
1A5	$3.	1S5	$2.	6AC5	$3.	6K6	$3.	6Z7	$2.	12AV6	$2.	14W7	$3.	40Z5	$2.	117Z3	$7.	6146	$4.
1A6	$3.	1T4	$3.	6AC7	$3.	6K7	$3.	6ZY5	$3.	12AX7	$2.	14Y7	$3.	41	$3.	117Z4	$4.	6188	$3.
1A7	$3.	1T5	$3.	6AG7	$3.	6K8	$3.	7A4	$3.	12B7	$3.	14R7	$3.	42	$3.	117Z6	$4.	6842	$2.
1B4	$3.	1U4	$3.	6AK5	$2.	6L5	$4.	7A5	$3.	12B8	$4.	14W7	$3.	43	$3.	485	$4.	6973	$2.
1B5	$3.	1U5	$3.	6AK6	$2.	6L6	$3.	7A6	$3.	12BA6	$2.	14X7	$3.	44	$3.	807	$4.	7025	$2.
1B7	$3.	1V	$4.	6AL5	$3.	6L7	$3.	7A7	$3.	12BE6	$2.	15	$5.	45	$5.	809	$6.	7193	$2.
1B8	$3.	2A3	$6.	6AL7	$4.	6N5	$4.	7A8	$4.	12C5	$3.	19	$4.	45Z3	$2.	837	$4.	9002	$3.
1C1	$4.	2A4	$5.	6AQ5	$2.	6N6	$3.	7AE7	$4.	12C8	$3.	19T8	$2.	45Z5	$2.	843	$3.	9003	$3.
1C5	$3.	2A5	$4.	6AQ7	$4.	6N7	$3.	7AF7	$4.	12F5	$3.	22	$5.	46	$6.	879	$2.	9004	$4.
1C6	$3.	2A6	$3.	6AS7	$3.	6P5	$3.	7AG7	$4.	12H6	$3.	24A	$5.	47	$5.	884	$7.	VR-	
1C7	$5.	2A7	$5.	6AT6	$2.	6Q7	$3.	7B4	$3.	12J5	$3.	25A6	$3.	48	$4.	923	$3.	90	$2.
1D5	$5.	2B7	$3.	6AU6	$2.	6R7	$4.	7B5	$3.	12J7	$3.	25A7	$3.	49	$4.	930	$3.	VR-	
1D7	$5.	2C26	$2.	6AV5	$2.	6S4	$4.	7B6	$3.	12K7	$3.	25AC5	$3.	50	$6.	950	$3.	105	$2.
1D8	$4.	2E5	$4.	6AV6	$2.	6S8	$3.	7B7	$3.	12K8	$3.	25B6	$3.	50A5	$3.	951	$3.	VR-	
1D21	$3.	2E30	$2.	6AX5	$2.	6SA7	$2.	7B8	$3.	12L6	$2.	25C6	$2.	50B5	$2.	955	$4.	150	$2.
1E5	$5.	2V3	$4.	6B4	$5.	6SB7	$3.	7C5	$3.	12Q7	$3.	25L6	$3.	50C5	$2.	958	$4.	VT-	
1E7	$4.	2W3	$4.	6B5	$5.	6SC7	$3.	7C6	$3.	12S8	$3.	25S	$3.	50C6	$3.	1005	$3.	52	$4.
1F4	$4.	2X2	$2.	6B6	$5.	6SD7	$3.	7C7	$3.	12SA7	$3.	25Z5	$3.	50L6	$3.	E1148	$2.	XXB	$3.
1F5	$4.	3A4	$3.	6B7	$5.	6SF5	$3.	7E6	$3.	12SC7	$3.	25Z6	$3.	50X6	$3.	1201	$3.	XXFM	$3.
1F6	$4.	3A5	$3.	6B8	$3.	6SF7	$3.	7E7	$3.	12SF5	$3.	26	$4.	50Y7	$3.	1203	$3.	XXL	$3.
1F7	$5.	3A8	$3.	6BA6	$2.	6SG7	$3.	7F7	$4.	12SF7	$3.	26A6	$4.	51	$3.	1232	$3.		
1G4	$4.	3C6	$3.	6BE6	$3.	6SH7	$3.	7F8	$4.	12SG7	$3.	26A7	$4.	53	$5.	1273	$3.		
1G5	$4.	3LF4	$5.	6BJ6	$2.	6SJ7	$3.	7G7	$3.	12SH7	$3.	27	$3.	55	$4.	1612	$3.		
1G6	$4.	3Q4	$3.	6C4	$2.	6SK7	$3.	7H7	$3.	12SJ7	$3.	28D7	$3.	56	$3.	1620	$3.		
1H4	$5.	3Q5	$3.	6C5	$3.	6SL7	$3.	7J7	$3.	12SK7	$3.	30	$3.	57	$3.	1625	$4.		
1H5	$3.	3S4	$2.	6C6	$3.	6SN7	$2.	7K7	$3.	12SL7	$3.	31	$3.	58	$3.	1626	$3.		
1H6	$3.	3V4	$2.	6C7	$4.	6SQ7	$3.	7L7	$3.	12SN7	$3.	32	$3.	59	$4.	1629	$4.		
1J6	$4.	5AZ4	$4.	6C8	$4.	6SR7	$3.	7N7	$4.	12SQ7	$3.	32L6	$3.	70A7	$3.	1633	$3.		
1L4	$4.	5R4	$2.	6CB6	$2.	6SS7	$3.	7Q7	$3.	12SR7	$3.	32L7	$2.	70L7	$3.	1634	$3.		
1L6	$6	5T4	$2.	6D6	$4.	6ST7	$3.	7R7	$3.	12V6	$3.	33	$3.	71A	$6.	1635	$3.		
1LA4	$4.	5U4	$2.	6D7	$4.	6SU7	$3.	7S7	$3.	12W6	$3.	34	$3.	75	$3.	1636	$3.		
1LA6	$4.	5V4	$2.	6D8	$4.	6SV7	$3.	7V7	$3.	12X4	$2.	35	$3.	76	$3.	1852	$3.		
1LB4	$4.	5V6	$2.	6E5	$4.	6T7	$4.	7W7	$3.	12Z3	$2.	35A5	$4.	77	$3.	1853	$3.		
1LC5	$5.	5W4	$2.	6E6	$4.	6T8	$2.	7X6	$3.	14A4	$3.	35B5	$2.	78	$3.	2050	$3.		
1LC6	$4.	5X4	$3.	6E7	$4.	6U5	$4.	7X7	$3.	14A5	$3.	35C5	$2.	79	$3.	2051	$3.		
1LD5	$4.	5Y3	$3.	6F5	$3.	6U6	$3.	7Y4	$3.	14A7	$3.	35L6	$3.	80	$3.	CK108	$3.		

COMPLETE CATALOG

SEND 50¢ IN STAMPS PLUS A SELF-ADDRESSED STAMPED ENVELOPE FOR OUR COMPLETE CATALOG. IN ADDITION TO TUBES AND SCHEMATIC DIAGRAMS, WE CAN ALSO SUPPLY KNOBS, DIAL ESCUTCHEONS, TUNING DRIVE BELTS, ANTIQUE TUBE CARTONS, OLD-STYLE GLASS ENVELOPE TUBES, SPECIAL TUBES FOR TUBE COLLECTORS, ANTIQUE WIRE, MORE RECENT TYPE-NUMBER AND TV TUBES, SPECIAL MAINTENANCE AND SERVICE NOTES ON SPECIFIC RADIO SETS, ANTIQUE RECORD CHANGER DATA, ANTIQUE PA SYSTEM DATA AND SCHEMATICS, OLD STYLE TUBE SHIELDS, AND SOME ORIGINAL PARTS FOR SETS.

IF YOU DO NOT SEE A TUBE WHICH YOU SEEK LISTED, SEND A SELF-ADDRESSED STAMPED ENVELOPE. WE MAY BE ABLE TO RECOMMEND A SOURCE OF SUPPLY.

MILITARY TYPE (VT) AND EQUIVALENT COMMERCIAL-TYPE TUBE CROSS-REFERENCE LIST Send $1.00 plus a self-addressed stamped envelope.

We offer free technical advice for a self-addressed stamped envelope or you may call J.W.F. Puett at 214 - 279-8309 NO LATER THAN 10:00 PM CENTRAL STANDARD TIME OR CENTRAL STANDARD DAYLIGHT TIME (when applicable) PLEASE.

TABLE 2 - OLD STYLE TUBES All are new many in original cartons:

RADIOTRON		MAJESTIC	
UY227	$5.	GL5	$5.
CUNNINGHAM		2A6	$4.
C327	$5.	2B7	$3.
CX345	$6.	G31	$4.
CX347	$6.	6C7	$4.
CX371A	$7.	6D7	$4.
EVEREADY		6E7	$4.
ER551	$4.	46B1	$5.
		GA6A1S	$5.
		G625	$3.

We have many others used such as W.E. 205D at $6. Send self-addressed stamped envelope for list.

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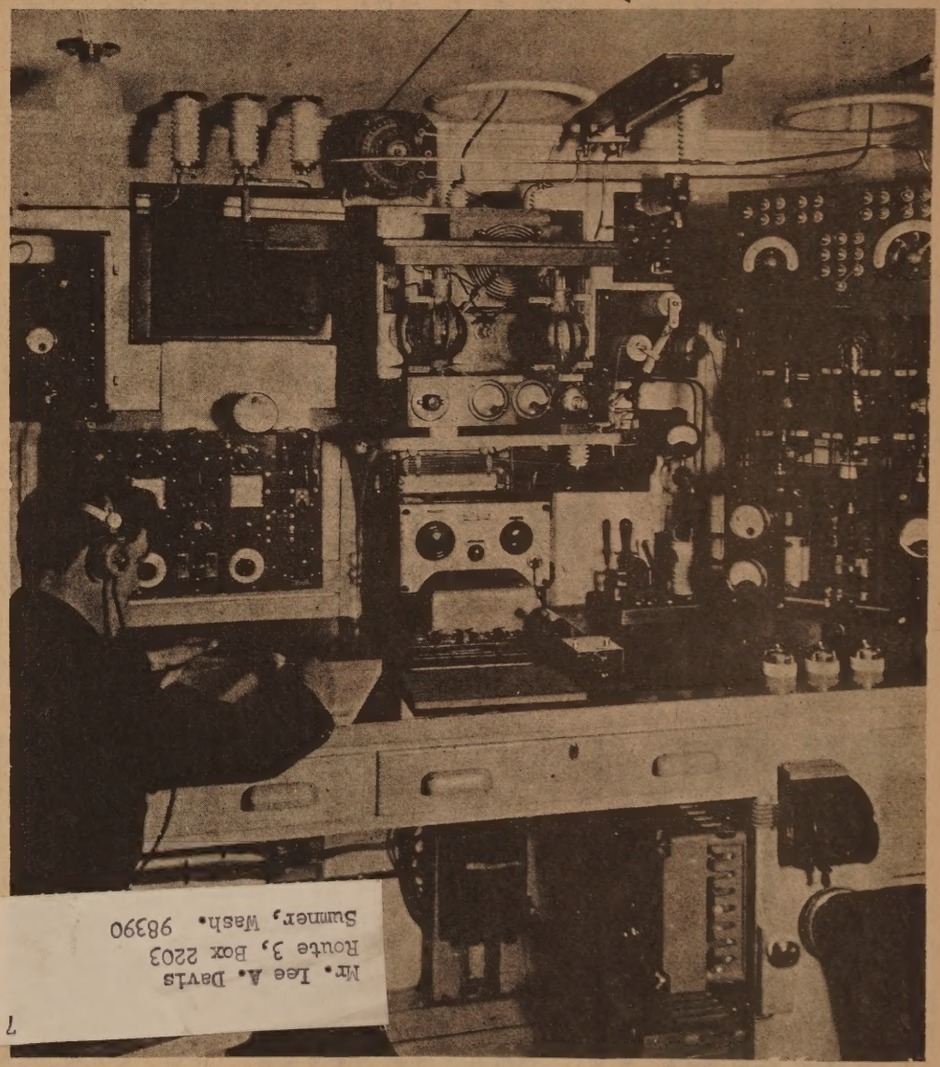
DECEMBER

75c

THE HORN SPEAKER

1975



Mr. Lee A. Davis
Route 3, Box 2203
Sumner, Wash. 98390

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"On board" the radio operator is recognized as an officer of his ship with almost as much responsibility for his passengers as the captain. In his cabin, surrounded by complicated radio apparatus of all varieties, he is supreme. Every soul aboard relies on him for contact with the outside world, for weather reports, storm warnings, news and emergency messages. This is the radio cabin of the Discovery II, showing the long and short-wave transmitters and receivers of types easily recognizable at once by the well-informed operator

RADIO NEWS FOR OCTOBER, 1932